Overview of Epidemic Modeling Initiatives at HHS

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- **Overview of Epidemic Modeling Initiatives at HHS**
- **Results of Smallpox Modeling Working Group, Phase I**
- **Overview of one smallpox model**

Modeling at HHS: December 2001

- **Modelers and policy experts met at FIC to discuss the potential value of modeling in assisting bioterrorism preparedness efforts**
  - **Consensus: modeling is a valuable tool to compare different policy strategies**
  - **But: there are limitations and they must be understood**
  - **Recommendations: “proof of principle” project should be undertaken to address “a limited set of decision-oriented questions about intervention strategies following the introduction of a particular agent”**

Summer 2002

- **Smallpox Modeling Working Group formed**
  - **Explore a range of policy options related to smallpox preparedness and response**
  - **Chair: Dr. Chin**
  - **3 modeling groups selected**
  - **WG includes modelers, infectious diseases and health policy experts and Council members (Drs. Henderson, Chin and Murphy)**
- **HHS developed an interagency agreement with Fogarty**
  - **Fogarty has taken the lead in coordinating all activities**

Smallpox Working Group Modelers

- **Dr. John Glasser**
  - **CDC**
- **Drs. Betz Halloran and Ira Longini**
  - **Emory School of Public Health**
- **Drs. Don Burke and Joshua Epstein**
  - **Johns Hopkins SPH & Brookings Institute**

December 2002

- **WG held 1st meeting**
- **Consensus: for project to be of value, modelers need to agree on set of biologically realistic input parameters for smallpox natural history and transmission**

  Or else, "garbage in, garbage out"
- **Thus: great deal of effort was placed in developing standardized input parameters**
- **Also developed**
  - **Outbreak scenarios**
  - **Outbreak containment measures**
  - **Important outcome measures**

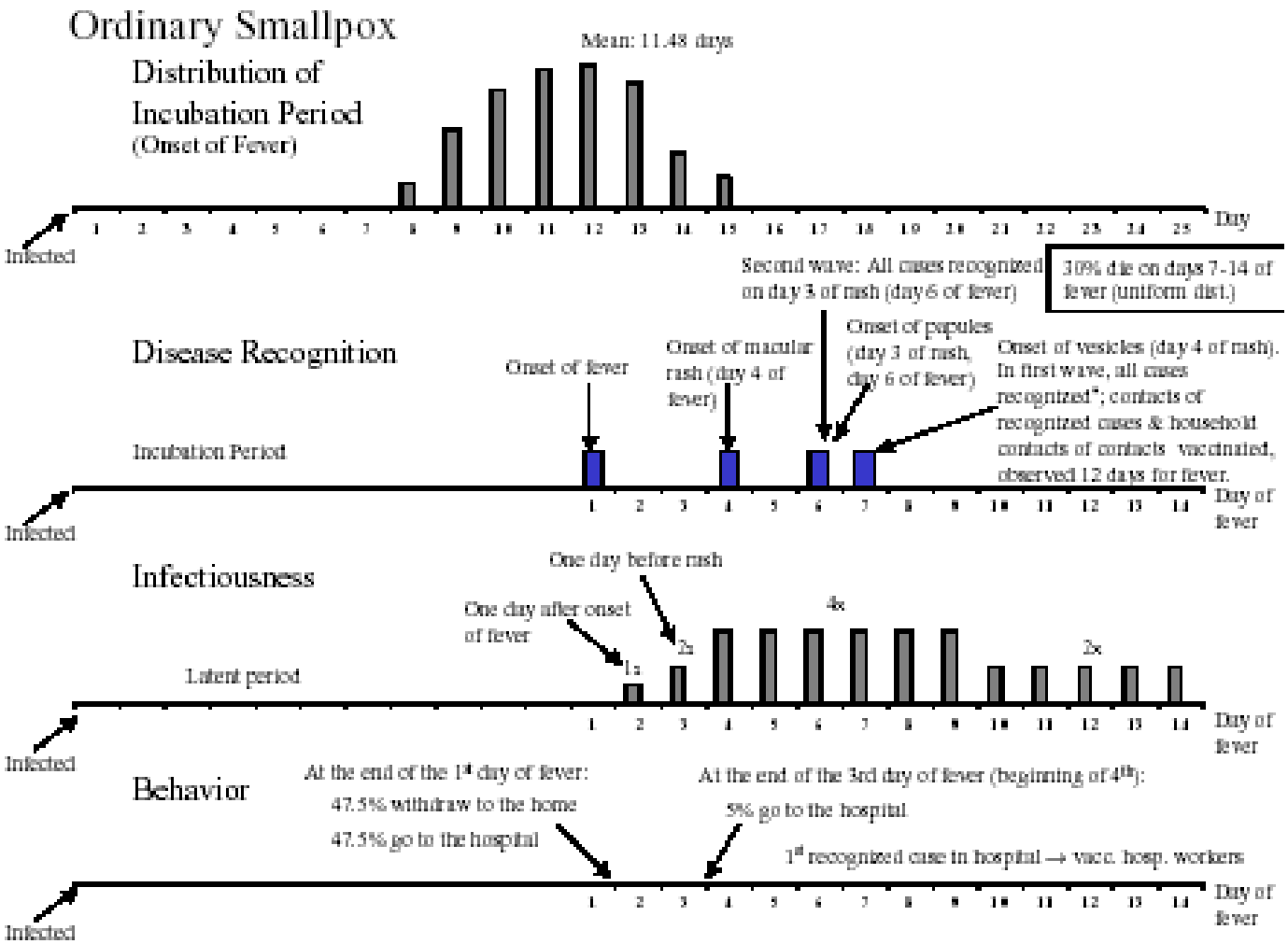
Outbreak Scenarios

- **Scenario 1 (small)**
  - **10 adult cases from an aerosol release in a restaurant, in a town of 5,000-6,000 people**
- **Scenario 2 (medium)**
  - **500 mixed (adult and children) cases from an aerosol release in a movie-theater, in a town of 48,000-50,000 people**

Standardized Parameters

- Distribution of disease
  - Ordinary, modified, hemorrhagic
- General population structure
- Vaccine efficacy
- Characteristics of disease
  - Progression
  - Infectiousness
  - Behavior of infected people

Standardized Parameters



Theoretical Outbreak Control Measures

	Scenario									
	1	2	3	4	5	6	7	8	9	10
Background Immunity	No	Yes	→	→	→	→	→	→	→	→
Household contact trace 100%			Yes	→	→	→	→	→	→	→
Work/school contact trace 75%			Yes	→	→	→	→	→	→	→
Hospital Vac & Isol (>20d)			Yes	→	→	→	→	→	→	→
Preemptive Hospital Vaccination				10%	50%	10%	50%	10%	50%	10%
Reactive School Closure 10 d						Yes	→	→	→	→
Mass Reactive Vaccination						40%	40%	80%	80%	None

Outcome Measures

- Total number of cases
- Proportion of cases within hospitals
- Number of deaths
- Number of persons vaccinated
- Duration of epidemic

New Efforts

- **Underway**
  - **Smallpox Modeling WG - Phase 2**
    - **10,000 cases from an aerosol release in a sports arena occurring in a city of 1.6 million people**
- **Immediate future**
  - **New IAAs signed between HHS and Fogarty**
  - **Anthrax Modeling WG**
    - **Will meet October 2-3, 2003**
  - **SARS Modeling WG**
    - **Will meet Jan 2004**

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